
CHAPTER IV N

Pixley National Wildlife Refuge Alternative Plans



***U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
MID-PACIFIC REGION***

CHAPTER IV N

PIXLEY NATIONAL WILDLIFE REFUGE

The Pixley National Wildlife Refuge (Refuge) was established in 1959 when reverted homestead tracts were transferred to the Service from the California Department of Food and Agriculture. The Refuge boundaries have since expanded and currently include 5,200 acres controlled by the Service, 800 acres controlled by the U.S. Forest Service, and 2,800 acres owned by private land owners. The Refuge is managed by the Service and is located in southwest Tulare County.

The Refuge has grassland vegetation with some riparian plants along Deer Creek. Approximately 3,700 acres are set aside as habitat for the endangered blunt-nosed leopard lizard, and are currently used for livestock grazing. The primary objective of the Refuge is to restore wildlife habitat, particularly for migratory waterfowl and endangered species (USFWS, 1978).

A. WATER RESOURCES

The Refuge does not have any firm water supplies. Water is diverted from Deer Creek or provided by Pixley Irrigation District (PID).

1. Surface Water

The Refuge does not have water rights, riparian or appropriative. Deer Creek traverses the western half of the Refuge, as shown in a Figure IV N-1. This creek is an intermittent stream which carries flood flows during wet years (USFWS, 1978). During wet years, upstream irrigation districts also allow excess water to flow down Deer Creek to the Refuge. Deer Creek also could be used to convey water from the Friant-Kern Canal (FKC) to the Refuge. Deer Creek does have a high potential for conveyance losses due to percolation, evaporation, and diversions along the creek. The quality of Deer Creek flood flows is suitable for irrigation and waterfowl management.

Another intermittent water source on the Refuge is the groundwater recharge basins maintained by PID. The two-cells provide about 200 acres of wetlands (USFWS, 1986).

2. Water Conveyance Facilities

Water is diverted from Deer Creek at a sand dam near Road 88. This sand dam needs to be maintained to prevent sand inundation or wash-out during flooding events. The Refuge internal conveyance system is generally in fair condition, however, minor improvements are needed.

3. Groundwater

The Refuge is located in the lower San Joaquin Valley which has a serious groundwater overdraft problem. The water level is 100 to 200 feet deep with considerable seasonal fluctuations. One well was drilled on the Refuge in 1963. Use of this well was discontinued in 1969 because of a receding water table and escalating energy costs. Groundwater from this well was of poor quality for irrigation, but suitable for waterfowl habitat management. Reclamation has estimated that the safe yield of the Refuge is 1,600 acre-feet.

B. FORMULATION AND EVALUATION OF ALTERNATIVE PLANS

The Service estimates that 6,000 acre-feet of water would be required for full development and optimum management of the entire Refuge. For the purposes of assessing the impacts of water delivery alternatives, four levels of water supply have been identified, as presented in Table IV N-1. Each of the water supply levels provides a different volume of water and are summarized as follows:

Level 1 - Existing firm water supply

Level 2 - Current average annual water deliveries

Level 3 - Water supply needed for full use of existing development

Level 4 - Water delivery needed for optimum management

1. Delivery Alternative for Level 1 (No Action Alternative) (0 acre-feet)

The Refuge does not have a firm water supply, therefore no alternatives were developed for Level 1.

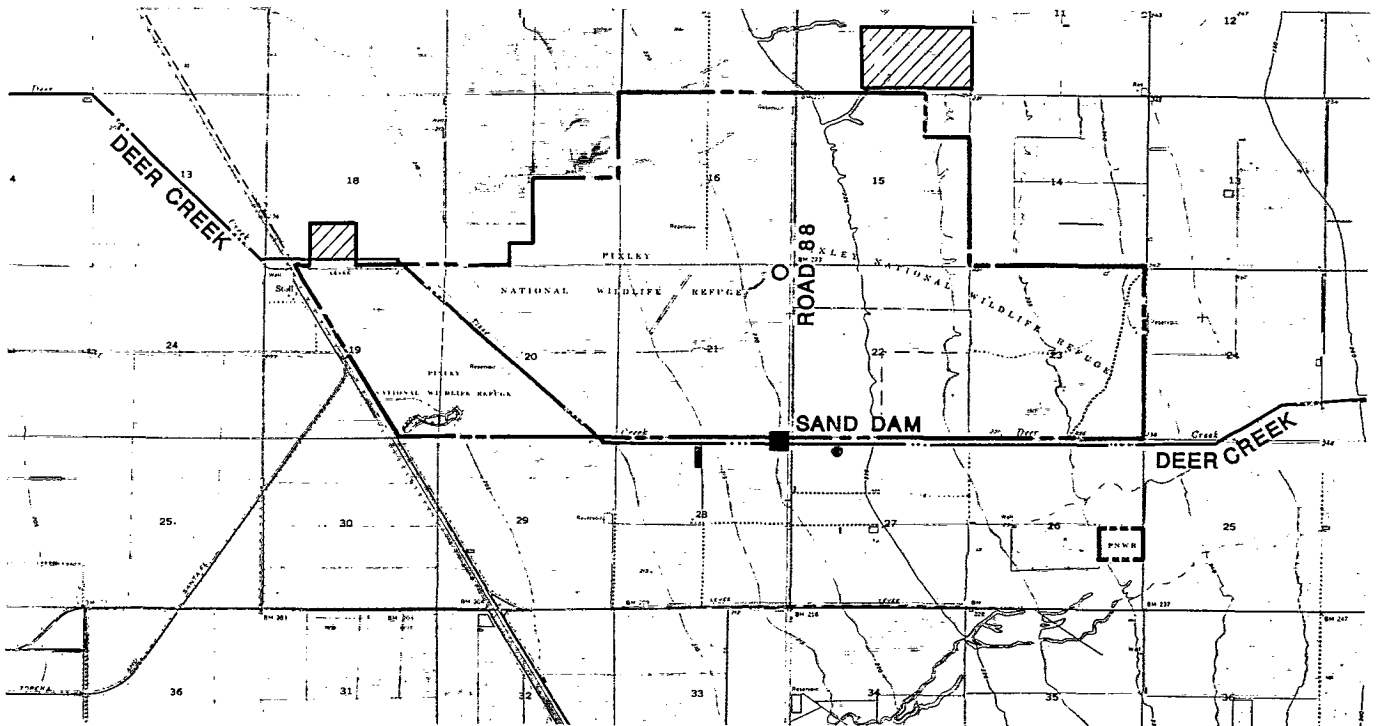
2. Delivery Alternative for Level 2 (1280 acre-feet)

Since this level represents the current average annual water supply, additional facilities would not be necessary.

3. Delivery Alternatives for Level 3 (3,000 acre-feet)

Under this level, construction and/or the use of the existing conveyance facilities may be required to fully serve the existing Refuge with an increased water supply.

Alternative 3A - Obtain Friant-Kern Canal Water Via Deer Creek. A dependable supply of water would be obtained from the FKC. This water would be conveyed to the Refuge by the Lower Tule River Irrigation District and PID. Water would be diverted from the FKC



LEGEND

- REFUGE BOUNDARY
- WATER COURSE
- DIRECTION OF FLOW
- WELL
- ▨ RECHARGE AREAS

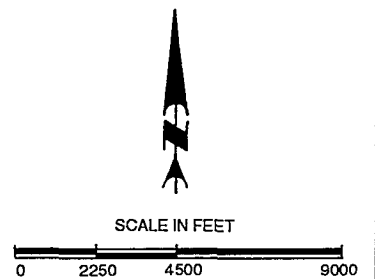


FIGURE IV N-1
PIXLEY NATIONAL WILDLIFE REFUGE
 EXISTING WATER SUPPLY FACILITIES

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TABLE IV N-1
DEPENDABLE WATER SUPPLY NEEDS
ALTERNATIVE SUPPLY LEVELS FOR THE PIXLEY NWR

Month	Supply Level 1 ac-ft	Supply Level 2 ac-ft	Supply Level 3 ac-ft	Supply Level 4 ac-ft
January	0	500(a)	100	200
February	0	600(a)	50	100
March	0	100(a)	0	0
April	0	80(a)	150	300
May	0	0	300	600
June	0	0	400	800
July	0	0	450	900
August	0	0	150	300
September	0	0	400	800
October	0	0	500	1,000
November	0	0	350	700
December	0	0	150	300
Total	0	1,280(a)	3,000	6,000

Notes:

Supply Level 1: Existing firm water supply
Supply Level 2: Current average annual water deliveries
Supply Level 3: Full use of existing development
Supply Level 4: Optimum management

(a) Estimated amounts, flood flows are not measured.

Sources: USBR, 1986a; USFWS, 1986d and 1986e

to Deer Creek at a point 15 miles upstream from the Refuge. Water would be delivered to the Refuge through Deer Creek, as shown in Figure IV N-2.

The internal distribution system would be improved through construction of a pump station at Deer Creek, 1 mile of delivery ditch, 6 miles of new levees, 3 miles of levee repairs, and 16 control structures.

Alternative 3B - Utilize Mid-Valley Canal Water Via Deer Creek. If the proposed Mid-Valley Canal (MVC) is constructed by Reclamation, CVP water could be delivered through the MVC to Deer Creek. The Canal would cross Deer Creek approximately seven miles upstream of the Refuge. This alternative would have less conveyance losses than Alternative 3A. However, the MVC has not been authorized for construction.

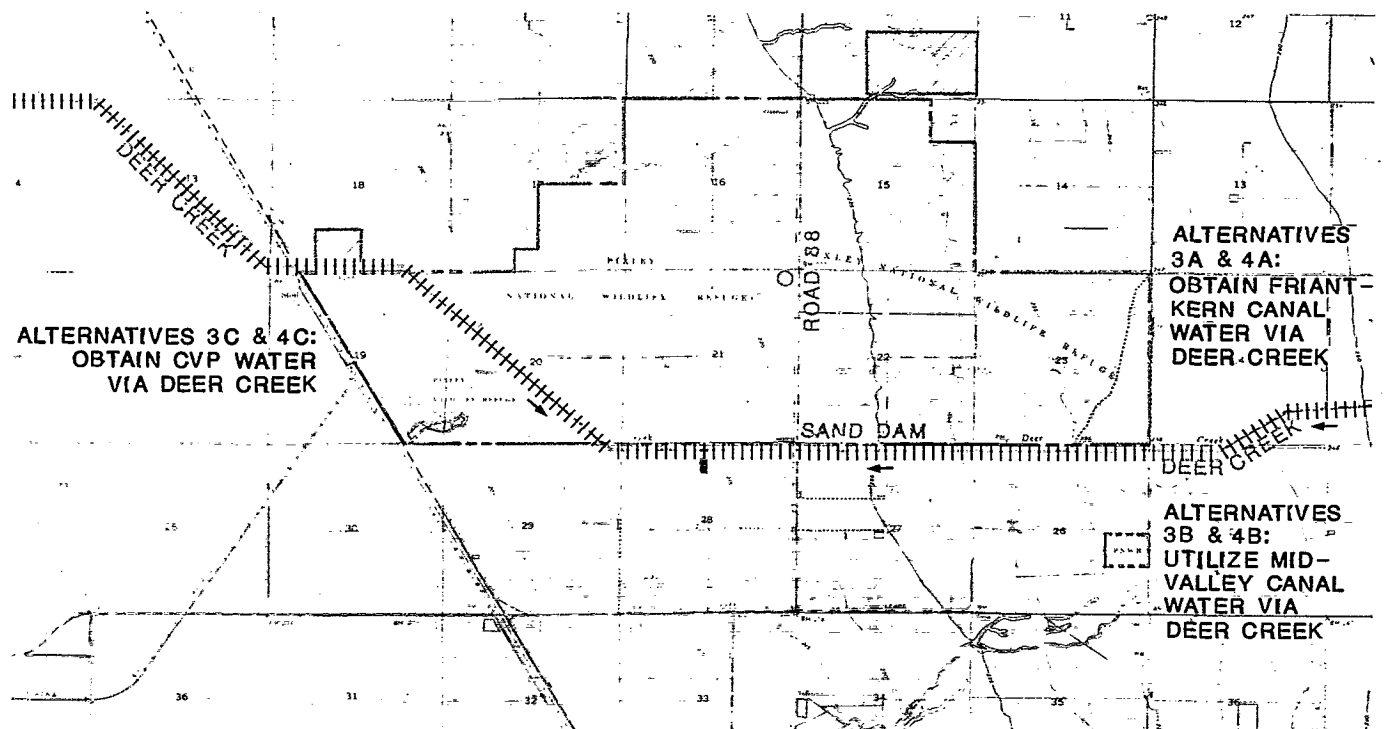
The internal distribution system would be improved through construction of a pump station at Deer Creek, 1 mile of delivery ditch, 6 miles of new levees, 3 miles of levee repairs, and 16 control structures.

Alternative 3C - Obtain CVP Water via the California Aqueduct. Water would be conveyed through the California Aqueduct to Lateral B of the Tulare Basin Water Storage District. This water would be pumped into Bull Slough and conveyed to the Homeland/Lakeland Canal. Water would be delivered through the Homeland/Lakeland Canal to Deer Creek. The water would flow in the reverse direction of the natural flow in Deer Creek to the Refuge.

The internal distribution system would be improved through construction of a pump station at Deer Creek, 1 mile of delivery ditch, 6 miles of new levees, 3 miles of levee repairs, and 16 control structures.

Alternative 3D - Implement a Conjunctive Use Plan. Seven wells would be constructed on the Refuge to deliver the maximum month water demand. The exact locations of the wells would be determined in a future study. The wells would be developed as part of a conjunctive use program. During dry years, water demands would be supplied by wells, as discussed in Chapter III. During wet years, the wells would probably not be needed if CVP water is provided. Implementation of this alternative also would require implementation of Alternative 3A, 3B, or 3C.

The internal distribution system would be improved through construction of a pump station at Deer Creek, 1 mile of delivery ditch, 6 miles of new levees, 3 miles of levee repairs, and 16 control structures.



LEGEND

- REFUGE BOUNDARY
- WATER COURSE
- DIRECTION OF FLOW
- WELL
- RECHARGE AREAS
- ||||| PROPOSED CONVEYANCE FACILITIES



SCALE IN FEET

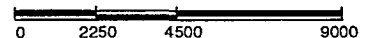


FIGURE IV N-2

PIXLEY NATIONAL WILDLIFE REFUGE

ALTERNATIVE WATER SUPPLY FACILITIES

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4. Delivery Alternatives for Level 4 (6,000 acre-feet)

Water Supply Level 4 would be conveyed through facilities discussed for Level 3.

Alternative 4A - Obtain Friant-Kern Canal Water Via Deer Creek. This alternative is identical to Alternative 3A.

Alternative 4B - Utilize Mid-Valley Canal Water Via Deer Creek. This alternative is identical to Alternative 3B.

Alternative 4C - Obtain CVP Water via the California Aqueduct. This alternative is identical to Alternative 3C.

Alternative 4D - Implement a Conjunctive Use Plan. Fourteen wells would be constructed on the Refuge to deliver the maximum month water demand. This alternative would be similar to Alternative 3D. Implementation of this alternative also would require implementation of Alternative 4A, 4B, or 4C.

5. Summary of Alternatives

The beneficial and adverse effects of each alternative were compared with respect to the criteria listed in Chapter III.

There are no alternatives for Water Supply Levels 1 and 2.

Alternatives 3A and 4A utilize the existing creek and require minimal additional facilities. Alternatives 3A and 4A would require long-term agreements with PID or Lower Tule River Irrigation District.

Alternatives 3B and 4B may be considered in the future if the MVC is authorized.

Alternatives 3C and 4C would require extensive operation costs due to the pumping requirements. Long-term conveyance agreements with the Tulare Basin Water Storage District would be required for Alternatives 3C and 4C.

Alternatives 3D and 4D would result in overdraft conditions because the water need during the dry years would exceed the safe yield of the Refuge. These alternatives would require implementation of surface water alternatives (Alternatives 3A through 3C and Alternatives 4A through 4C) to convey surface water during wet years.

C. COSTS AND ECONOMICS ANALYSIS

Costs for the alternative plans to provide adequate water supplies under Water Supply Levels 3 and 4 are presented in Table IV N-2. The construction costs include factors to cover

TABLE IV N-2
SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES
PIXLEY NWR

Items	Alternatives							
	3A	3B	3C	3D	4A	4B	4C	4D
Additional Water (ac-ft)	3,000	3,000	3,000	3,000	6,000	6,000	6,000	6,000
Construction Costs								
Wells	\$ --	\$ --	\$ --	\$ 594,300 ^(g)	\$ --	\$ --	\$ --	\$1,188,600 ⁽ⁱ⁾
Diversion Structures	--	11,000 ^(c)	11,000 ^(e)	--	--	11,000 ^(e)	11,000 ^(e)	--
Pipelines/Canals	406,000 ^(a)	406,000 ^(a)	406,000 ^(a)	--	406,000 ^(a)	406,000 ^(a)	406,000 ^(a)	--
Pump Stations	200,000 ^(a)	200,000 ^(b)	400,000 ^(f)	--	200,000 ^(b)	200,000 ^(b)	400,000 ^(f)	--
Subtotal	\$606,000	\$617,000	\$817,000	\$ 594,300	\$606,000	\$617,000	\$817,000	\$1,188,600
Other Costs	--	--	--	606,000 ^(h)	--	--	--	606,000 ^(h)
Total	\$606,000	\$617,000 ^(d)	\$817,000	\$1,200,300	\$606,000	\$617,000 ^(d)	\$817,000	\$1,794,600
Annualized Construction Cost (8.87%, 30 yrs)	\$ 58,300	\$ 59,360	\$ 78,600	\$ 115,470	\$ 58,300	\$ 59,360	\$ 78,600	\$ 172,640
Additional Annual Cost								
Operation & Maintenance ^(j)	\$ 2,400	\$ 2,400	\$ 5,800	\$ 20,210	\$ 2,400	\$ 2,400	\$ 5,800	\$ 40,400
Power	7,950 ^(k)	7,950 ^(k)	15,900 ^(k)	48,000 ^(m,n)	15,900 ^(k)	15,900 ^(k)	31,800 ^(k)	96,000 ^(m,n)
Local Conveyance Cost	12,750 ^(l)	12,750 ^(l)	12,750 ^(l)	--	25,500 ^(l)	25,500 ^(l)	25,500 ^(l)	--
Subtotal	\$ 23,100	\$ 23,100	\$ 34,450	\$ 68,210	\$ 43,800	\$ 43,800	\$ 63,100	\$ 136,400
Other Costs	--	--	--	11,550 ^(h,n)	--	--	--	21,900 ^(h,n)
Total	\$ 23,100	\$ 23,100 ^(d)	\$ 34,450	\$ 79,760	\$ 43,800	\$ 43,800	\$ 63,100	\$ 158,300
Total Annual Costs	\$ 81,400	\$ 82,460	\$113,050	\$ 195,230	\$102,100	\$103,160	\$141,700	\$ 330,940
Cost/Additional Acre/Foot	\$ 27.20	\$ 27.50	\$ 37.70	\$ 65.10	\$ 17.00	\$ 17.20	\$ 23.60	\$ 55.20

TABLE IV N-2
SUMMARY OF ESTIMATED COSTS OF ALTERNATIVES
PIXLEY NWR
(Continued)

Notes: Alternatives 3A and 4A - Obtain Friant-Kern Canal Water via Deer Creek
Alternatives 3B and 4B - Utilize Mid-Valley Canal Water via Deer Creek
Alternatives 3C and 4C - Obtain CVP Water via the California Aqueduct
Alternatives 3D and 4D - Implement a Conjunctive Use Plan

- (a) 5,280 feet of ditches; 31,680 feet of new levees; 15,840 feet of levee repairs; and 16 control structures.
- (b) 20 cfs pump, 30-foot lift.
- (c) 36-inch diameter turnout on Mid-Valley Canal at Deer Creek, 12 cfs
- (d) Costs do not include costs for Mid Valley Canal.
- (e) 36-inch diameter turnout on Homeland/Lakeland Canal, 12 cfs.
- (f) Two 20 cfs pump, 30-foot lift.
- (g) 7 wells, 900-feet deep, 250-foot lift.
- (h) Alternatives 3D and 4D assume implementation of Alternatives 3A and 4A, respectively.
- (i) 14 wells, 900-feet deep, 250-foot lift.
- (j) Basis for O&M costs are discussed in Appendix F.
- (k) Unit Pumping Cost = \$2.65/af.
- (l) Unit Conveyance Cost = \$4.25/af.
- (m) Unit Pumping Cost = \$32/af.
- (n) Values are multiplied by 0.5 because facilities will be used 5 out of 10 years.

engineering, contingencies, and overhead. Annual operation and maintenance (O&M) costs include only the local cost of delivering water. The annual O&M costs do not include the cost to purchase CVP water. During the advanced planning phase, these costs will be refined further.

Construction of the facilities under any of the alternatives would result in additional money being spent in Tulare County during construction. The construction could be completed within one summer season by construction workers who reside in the area.

Currently, the annual public use at the Refuge is about 300 visits per year. If additional water is provided, attendance levels would increase significantly. (USFWS, 1986).

D. WILDLIFE RESOURCES

The annual bird use on the Refuge is limited to wetland dependent endangered, candidate, and sensitive species. The Service estimates that the Refuge receives approximately 6,000 use-days annually. Wildlife resources associated with the Refuge are presented in Table IV N-3. The listed threatened and endangered species associated with the Refuge are the peregrine falcon, Falco peregrinus anatum; bald eagle, Haliaeetus leucocephalus; San Joaquin kit fox, Vulpes macrotis mutica; and the blunt-nosed leopard lizard, Gambelia silus. Numerous candidate species may occur in this area and are presented in Table IV N-4.

Implementation of any of the alternative plans probably would not adversely affect the listed and candidate threatened and endangered species and may improve habitat that would be used by the San Joaquin kit fox and the blunt-nosed leopard lizard. Table IV N-5 describes the increase in wildlife resources as a result of the various water supply levels. Detailed field investigations will be necessary during the advanced planning phase of the project. Additional regional environmental analyses will be completed as part of the Water Contracting EIS's.

E. SOCIAL ANALYSIS

The social consequences of alternatives for Levels 3 or 4 would be positive due to the potential increase in public use.

F. POWER ANALYSIS

The Pacific Gas and Electric Company serves the Refuge under the PA-1 rate schedule for agricultural users. A facility must be an authorized function of the CVP to receive project-use power. The authority to deliver CVP project-use power to the Refuge is currently being examined and will be detailed in the Refuge Water Supply Planning Report. A more detailed discussion of project-uses power and wheeling agreements is provided in the Power Analysis

TABLE IV N-3
WILDLIFE RESOURCES
PIXLEY NWR

Ducks

Pintail
Wigeon
Northern Shoveler

Mallard
Gadwall
Green-winged Teal

Cinnamon Teal
Wood Duck

Geese and Swans

Canada Goose
White-fronted Goose

Snow Goose
Ross' Goose

Coots

American Coot

Shore and Wading Birds

Pied-billed Grebe^(a)
American Bittern
Great Blue Heron
Long-billed Dowitcher
Black-crowned Night Heron
White-faced Ibis

American Avocet
Black-neck Stilt
Common Snipe
Green-backed Heron
Western Sandpiper

Killdeer^(a)
Long-billed Curlew
Snowy Egret
Least Sandpiper
Greater Sandhill Crane
Mountain Plover

TABLE IV N-3
WILDLIFE RESOURCES

PIXLEY NWR
(Continued)

Upland Game

Ring-necked Pheasant

Mourning Dove^(a)

Raptorial Birds

Black-shouldered Kite
Rough-legged Hawk
Swainson's Hawk
Ferruginous Hawk

Northern Harrier
American Kestrel (Sparrow Hawk)^(a)
Prairie Falcon
Merlin

Red-tailed (Harlan) Hawk^(a)
Golden Eagle
Burrowing Owl
Sharp-shinned Hawk

Furbearers

Raccoon
Coyote
San Joaquin Kit Fox

Badger
Long-tailed Weasel
Skunks

Notes:

(a) Birds nesting on refuge

Source: Environmental Assessment Report, Mendota Wildlife Area, and checklist of the birds of the Mendota Wildlife Area.

TABLE IV N-4

FEDERALLY LISTED, PROPOSED, & CANDIDATE THREATENED & ENDANGERED SPECIES

PIXLEY NWR

Listed Species

Mammals

San Joaquin kit fox, Vulpes macrotis mutica (E)

Reptiles

Blunt-nosed leopard lizard, Gambelia silus (E)

Birds

Bald eagle, Haliaeetus leucocephalus (E)

American peregrine falcon, Falco peregrine anatum (E)

Proposed Species

None

Candidate Species

Mammals

Tipton kangaroo rat, Dipodomys n. nitratoideus (2)

Nelson's Antelope Ground Squirrel, Ammospermophilus nelsoni (2)

Birds

White-faced ibis, Plegadis chihi (2)

Tricolored blackbird, Agelaius tricolor (2)

Mountain Plover, Charadrius montanensis (2)

Ferruginous Hawk, Buteo regalis (2)

Long-Billed Curlew, Numenius americanus (2)

Invertebrates

Hopping's blister beetle, Lytta hoppingi (2)

Moestan blister beetle, Lytta moesta (2)

Molestan blister beetle, Lytta molesta (2)

Morrison's blister beetle, Lytta morrisoni (2)

A land snail, Helminoglypta callistoderma (2)

Plants

Lost Hills saltbush, Atriplex vallicola (2)

Hispid bird's-beak, Cordylanthus mollis subsp. hispidus (2)

California jewelflower, Caulanthus californicus (2)

Congdon's wooly-threads, Lembetia congdonii (2R)

Hoover's wooly-star, Eriastrum hooveri (2)

Source: USFWS, June 4, 1987

(E)—Endangered

(T)—Threatened

(CH)—Critical Habitat

(1)—Category 1: Taxa for which the Fish and Wildlife Service has sufficient biological information to support a proposal to list as endangered or threatened.

(2)—Category 2: Taxa for which existing information indicated may warrant listing, but for which substantial biological information to support a proposed rule is lacking.

(2R)—Recommended addition to Category 2.

TABLE IV N-5
WILDLIFE RECREATIONAL BENEFITS AND RESOURCE IMPACTS
PIXLEY NWR

	No Action Alternative	Alternatives							
		3A	3B	3C	3D	4A	4B	4C	4D
Habitat Acres									
Seasonal Marsh	--	400	400	400	400	550	550	550	550
Irrigated Marsh	--	400	400	400	400	400	400	400	400
Irrigated Crops	--	--	--	--	--	650	650	650	650
Bird Use Days									
Geese	--	133,600	133,600	133,600	133,600	267,200	267,200	267,200	267,200
Ducks	--	907,200	907,200	907,200	907,200	1,815,000	1,815,000	1,815,000	1,815,000
Waterbirds and Other Migratory Birds	--	405,600	405,600	405,600	405,600	811,200	811,200	811,200	811,200
Endangered Species	<u>6,000</u>	<u>477,700</u>	<u>477,700</u>	<u>477,700</u>	<u>477,700</u>	<u>1,300,000</u>	<u>1,300,000</u>	<u>1,300,000</u>	<u>1,300,000</u>
	6,000	1,924,100	1,924,100	1,924,100	1,924,100	4,193,400	4,193,400	4,193,400	4,193,400
Public Use Days									
Consumptive	--	3,300	3,300	3,300	3,300	6,500	6,500	6,500	6,500
Non-consumptive	<u>300</u>	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>3,800</u>	<u>3,800</u>	<u>3,800</u>	<u>3,800</u>
Total	300	5,300	5,300	5,300	5,300	10,300	10,300	10,300	10,300
Total Annual Cost	\$ --	\$ 81,400	\$ 82,460	\$ 113,050	\$ 195,230	\$ 102,100	\$ 103,160	\$ 141,700	\$ 330,940
Incremental Cost/Additional 1,000 Bird Use Days	N/A	\$ 42.40	\$ 43.00	\$ 58.90	\$ 101.80	\$ 24.40	\$ 24.60	\$ 33.80	\$ 79.00
Incremental Cost/Additional Public Use Day	N/A	\$ 16.30	\$ 16.50	\$ 22.60	\$ 39.00	\$ 10.20	\$ 10.30	\$ 14.20	\$ 33.10

Notes: Alternatives 3A and 4a: Obtain Friant-Kern Canal Water via Deer Creek.
 Alternatives 3B and 4B: Utilize Mid-Valley Canal Water via Deer Creek.
 Alternatives 3C and 4C: Obtain CVP Water via the California Aqueduct.
 Alternatives 3D and 4D: Implement a Conjunctive Use Plan.

power and wheeling agreements is provided in the Power Analysis section of Chapter II.

G. PERMITS

Construction activities would require several permits. Tulare County would issue permits for well construction under Alternatives 3D and 4D. Approvals for construction of pump stations would be required from the Tulare Lake Basin Water Storage District under Alternatives 3C and 4C. For construction activities in wetlands or riparian corridors, Stream Alteration Permits from DFG and an Army Corps of Engineers permit would be required.